meet the recitations of the claims. Applicants submit that the following comments effectively rebut the Office's response to Applicants' earlier remarks.

The Kawai Patent

The *Kawai* patent illustrates a GaN semiconductor laser in Figure 14. It includes a sapphire substrate 51 through which a via hole 61 is formed. An n-side Ti/Al electrode 61 is placed in the via hole 61 to make ohmic contact with the n-type GaN contact layer 53.

A major emphasis of the *Kawai* patent is that the via hole 61 is formed through a wet etch process. See col. 13, lines 36-47 and its implicit reference to col.11, lines 18-36 as well as col. 10, lines 53-60, for instance explaining the wet etch process.

The *Kawai* patent includes the statement that it is impossible to make a via hole in a sapphire substrate using other methods such as dry etching by RIE (see col. 2, lines 37-44 and col. 4, lines 52-53).

The Office acknowledges that the *Kawai* patent does not teach etching the sapphire substrate by a mixture of chlorine and argon but suggests that the *Nunoue* patent discloses such a method and that its teachings are sufficient to overcome *Kawai's* clearly negative teaching that dry etching a sapphire substrate is not possible.

What the *Nunoue et al.* patent actually discloses, however, is forming a trench by a reactive ion beam etching using Cl_2/Ar gas mixture and thereafter removing the layer damaged by the dry etching using a phosphoric acid etchant to thereby form the trench as illustrated in Figures 1a-1d. Thereafter, a multi-layered structure is

formed in the trench. As shown in Figure 1c, the sapphire substrate is polished until the buffer layer is exposed. Hence, in the embodiment shown in Figure 1, the *Nunoue et al.* patent actually discloses a mechanical mechanism for exposing the buffer layer forming part of the stack of layers on the sapphire substrate.

Accordingly, even if one were to accept, *arguendo*, the Offices position that the teachings of the *Nunoue et al.* are sufficiently strong to overcome the very explicit negative teaching that RIE dry etching is inappropriate for sapphire substrates in forming via holes, the hypothetical combination of these two teachings would be that the multi-layer structure of Figure 14 should be formed in a trench and thereafter the sapphire substrate mechanically polished to expose the bottom most layers of the multi-layer structure. Such hypothetical combination would not meet the steps of independent method claims 1 and 23 which include dry etching a region of the high resistant substrate using a reaction gas comprising at least Cl_2 or BCl_3 to expose the first compound semiconductor layer. The first compound semiconductor layer of the *Kawai* patent, employing the hypothetical combination of teachings, would be exposed through a polishing step then would actually involve a much different method from what is recited in independent claims 1 and 23.

With respect to the embodiment of Figures 7a-7g of the *Nunoue et al.* patent, it is noted the tapered contact hole 62 is formed in the first sapphire substrate 61 before any functional layers are formed on the first sapphire substrate 61. The contact hole 62 is formed by various mechanical, laser light and chemical processes such as chemical etching by phosphoric acid etchant. Thereafter, there are performed relatively elaborate processes of attaching a second sapphire substrate

64 onto a buffer layer 63 which in turn is formed on the first sapphire substrate 61, forming a barrier layer 65, removing the second sapphire substrate 64 and forming the multiple layers of semiconductor material on the first sapphire substrate 61. Again, even if one were to assume for a moment that the *Nunoue et al.* patent teachings were sufficiently strong to overcome the clear negative teachings in the *Kawai* patent, the hypothetical result would not be the combination of method steps recited in either independent claims 1 or 23 insofar as the hypothetical combination would still not involve a dry etching step wherein a region of the high resistant substrate is etched using a reaction gas comprising at least Cl_2 or BCl_3 to expose the first compound semiconductor layer. The hypothetical combination of teachings would result only in a method where the sapphire substrate would have a contact hole formed therein before any compound semiconductor layers are formed thereon and would involve multiple additional steps involving second sapphire substrates, etc. Succinctly, the hypothetical combination would not result in the combination of steps found in independent claims 1 or 23.

It is respectfully submitted that with respect to claims 1-4, 6, 9-11, 23-27, 31-35, even assuming hypothetical combination proposed in the Office Action, the hypothetical result would not meet the recitations of these claims.

With respect to claim 12, it is noted that a light-transmitting conductive layer is recited to cover the exposed region on the first compound semiconductor layer, which had been exposed by etching a region of the high-resistant substrate, as recited in claim 12. The Office takes the position that it is "well known in the art to form first and second electrodes, which are made of either light reflective or light

transmitting materials (see admitted prior art, para 006 and figure 1)." The *Nunoue et al.* patent appears to be silent with regard to whether either the electrodes are transparent and the *Kawai* patent clearly discloses that the bottom electrode conductive layer 36/37 covering the exposed region of the GAN semiconductor layer 22 consists of chromium and gold. It is respectfully submitted that it would be understood that these materials are not light transmitting as employed in the *Kawai* device. It is apparent that the applied prior art did not appreciate that light could be transmitted through the substrate via the portion that had been removed to expose the first compound semiconductor layer. The mere fact that both transparent and non-transparent electrodes are used in light emitting semiconductor structures does not suggest using a transparent electrode on a removed portion of a substrate particularly because this electrode is disclosed as being non-transparent.

In light of the foregoing, Applicants respectfully request reconsideration and allowance of the above-captioned application. Should any residual issues exist, the Examiner is invited to contact the undersigned at the number listed below.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

Date: January 3, 2005

By: _____
Charles F. Wieland III
Registration No. 33,096

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620